Arms Too Short, Sir?

by Cdr. Gary Tanner

As a squadron flight surgeon in the ’80s, I remember the day my XO failed his vision test during his annual flight physical. While I was away on leave, he called me in a panic concerned that he was “going blind.” He said he’d been referred to the optometry department for evaluation because of his 20/50 near-vision. No one had explained to him about the “birthday diseases,” those normal processes everyone experiences if they celebrate enough birthdays.

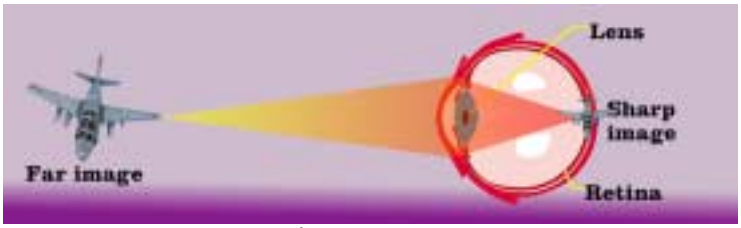

Figure 1
Normal Distance Vision

The eye has a lens that sharply focuses light on the retina in the back of the eye (Figure 1). An elastic, pliable lens is required to change your focus from your wingman to your kneeboard. As we age, the lens of our eye becomes less elastic and less able to focus on items that are closer than arm’s length (Figure 2). The ability to focus on near objects is known as accommodation and is greatest in childhood but diminishes as we age.

When the nearest point one can see clearly moves beyond a comfortable reading distance, the condition is termed “presbyopia,” literally, “old eye.” This process usually begins in a person’s early 40s but may occur earlier in those who are farsighted, like many of our aviators. Many aviators aren’t aware of this progressive condition until their annual physical, because their gauges and kneeboard are still far enough from their eyes to focus on without difficulty, and the near-vision test happens to be closer than they usually read. As objects are brought within approximately 1 meter from our eyes, the lens has to bend the light more to get the image to focus sharply on the retina in the back of our eyes. The lens accommodates by increasing the convexity of the lens, which increases the degree to which the light is “bent” or refracted. The closer the object to the eye, the more the light rays have to be refracted for the object to be seen sharply. Your lens must become more and more convex. The ability to do this is greatest in the very young and diminishes gradually with age.

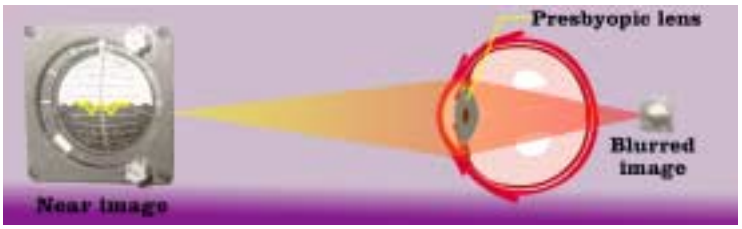

Figure 2
Blurred Near–Vision in a 45-Year-Old Aviator

You can demonstrate this phenomenon by having your 10-year-old son show you how close he can hold the paper to his nose and still read it. Compare his distance to that of your 35-year-old spouse.

To correct this situation, you have to place a lens in front of the eye to increase the “bend” of the light rays so they will focus sharply on the retina (Figure 3). The common corrective measure is “cheaters”–convex lenses. The strength of the lens determines the distance at which objects are in sharp focus. When your lens was

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Figure 3
Near Vision Corrected with Glasses

fully elastic, it became thicker and thinner as you desired to focus on near and far objects. Now the cheater lens determines the distance at which you can see clearly at near distances. Remember, the lens is no longer able to focus in and out at will. When this condition first strikes, you will only need minimal correction and will still have some lens elasticity, so you may be able to read both your kneeboard and gauges with just one lens power. Older aviators and farsighted aviators may require trifocals (Figure 4), which have two sets of near–vision refractive glass to focus on intermediate and near distances.

As you age, the elasticity of the lens continues to wane so you need stronger glasses for near–vision every three to five years until you are in your mid- to late-60s. The strength of the lens is determined by your individual needs. If your arms are too short to read your NATOPS comfortably, then you need a stronger lens. If you have to put your nose near the stick to see your kneeboard with your glasses on, I suggest weaker lenses.

Figure 4
Trifocal eyeglasses

Unfortunately, the glasses that assist your near vision will blur your distance vision. That is why most people opt for bifocals that have a distance correction in the top half of the glasses and a near correction in the lower half. If no distance correction is necessary, then the top half can be clear or you can choose the professorial look with "half eyes" or "granny glasses."

Some contact lenses are manufactured as bifocals, but they are a compromise. Most people can't see a crisp 20/20 at near or far distances with our current generation of bifocal contact lenses.

Refractive surgery (PRK, or photorefractive keratectomy) is an option for the very few. Those who are farsighted and prematurely presbyopic (in their late 30s) may indeed be candidates for this procedure but not most aviators. Remember, the problem isn't with the refractive state of the eye; it is with an aging lens. There are some new refractive procedures coming that may help with this situation, but it will be several years before they are available to aviators.

Back to the story I began this article with. We put the XO in the cockpit and measured the distance from his eyes to his kneeboard, then to the gauges. When he went for his eye evaluation and glasses prescription, he told the doc exactly what near distances he needed to be able to see clearly. He ended up with trifocals to see two separate sets–his kneeboard and gauges –clearly.

Since your personal needs and activities determine the correct strength of glasses, measuring the distances you need to see in the cockpit is by far the best way to prevent owning a helmet bag full of different glasses.

As you find your arms growing shorter, don't panic. There is a solution as near as the closest medical facility.

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